

107096



附件一

# MAGNETIC CRITERIA...

...multiple product grades and complex flux patterns are available with the use of Plastiform magnets.

## POLE CONFIGURATION...

whether single pole or double pole or even alternating multipole on a single sheet, 3M Company can provide the exact configuration for your specifications.

## FLUX PATTERNS...

with minimum reluctance in the magnetic circuit can be custom designed by 3M Company to meet critical tolerance requirements.

## ENERGY...

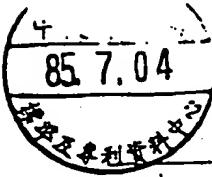
the ferrite particles in Plastiform magnets are highly oriented during processing to provide magnetic properties equal to, or superior to conventional isotropic ferrimagnets. This formulation decreases the chance of demagnetization or flux pattern changes during handling and operation.

	UNITS 1:CGS-U.S. units 2:SI (MKSA) units	PLASTIFORM		
		(PL-1)	(PL-1H)	(PL-1.4H)
MAGNETIC PROPERTIES (typical)				
Maximum energy product (at 23°C) (B <sub>d</sub> H <sub>d</sub> max.)	gauss x oersteds x 10 <sup>4</sup> teslas x amp. turn/m x 10 <sup>3</sup>	1.08 8.57	1.10 8.73	1.4 11.1
Residual induction <sup>1</sup> (Br) (at 23°C)	gauss millitesla	2150 215	2150 215	2450 245
Coercive Force <sup>1</sup> (Hc) (at 23°C)	oersteds ampere-turns/cm	1650 1315	1940 1545	2200 1950
Coercive Force intrinsic <sup>1</sup> (Hci) (at 23°C)	oersteds ampere-turns/cm	2150 1710	3000 2385	3000 2385
Incremental permeability (at 23°C)	ratio	1.08	1.08	1.04
Thermal coefficient of magnetization (-40 to 120°C)	% per °F % per °C	0.105 0.19	0.105 0.19	0.105 0.19
Thermal coefficient of intrinsic coercive force (-40 to 120°C)	% per °F % per °C	0.12 0.22	0.07 0.13	0.07 0.13
Peak magnetizing force required	oersteds ampere-turns/cm	10000 8000	10000 8000	10000 8000

TEST METHODS: 1-Pole-call Hysteresigraph

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	UNITS CGS-U.S. units SI (MKSA) units	PLASTIFORM VALUES
<b>PHYSICAL PROPERTIES (typical)</b>		
Density <sup>2</sup> (at 23°C)	lbs/in <sup>3</sup> gm/cm <sup>3</sup>	0.134 3.71
Hardness <sup>3</sup> (at 23°C)	Shore D	55
Tensile strength <sup>4</sup> (at 23°C)	psi N/cm <sup>2</sup>	640 440
Flexibility <sup>5</sup> (at 23°C)	180° bending on mandrel with O.D. equal to 7X sample thickness	Pass
Volume resistivity <sup>6</sup> (at 23°C and 50% R.H.)	ohm-cm	10 <sup>10</sup>
Dielectric Strength <sup>7</sup> (at 23°C and 50% R.H.)	volts/mil kV/mm	250 10
Thermal coefficient of thickness expansion (4 to 120°C)	mil/mil per F cm/cm per °C	9.8 x 10 <sup>-5</sup> 18 x 10 <sup>-5</sup>
Maximum continuous operating temperature	F C	250 120

TEST METHODS: 2. ASTM D-297 5. 3M Test Method

3. ASTM D-2240 6. ASTM D-257

4. ASTM D-412 7. ASTM D-149

### Typical Chemical Resistance (Nitrile Rubber Binder)

\* All values shown are averages and not intended for specification purposes.  
Specification values will be provided upon request.

\*\* Good — minor or no effect; up to 10% swell in thickness.  
Fair — moderate effect; 10-25% swell in thickness.  
Poor — severe effect; greater than 25% swell in thickness.

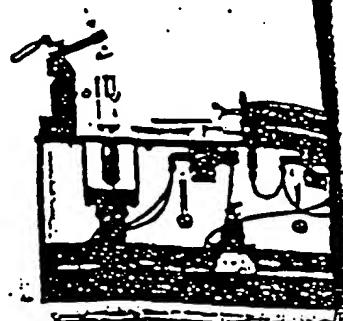
Chemical (7 days immersion @ RT)	Performance**
Motor Oil	Good
Transmission Oil	Good
Hydraulic Fluid	Good
Kerosene	Good
JP-4 Fuel	Fair
Gasoline	Fair
Heptane	Fair
Antifreeze	Good
Clorox	Good
Turpentine	Good
Water	Good
Detergents	Good
Salt Spray	Good
Aromatic Hydrocarbons (Benzene, Toluene, Xylene)	Poor
Chlorinated Hydrocarbons (Carbon Tetrachloride, Trichloroethylene)	Poor
Ketones	Poor
Alcohols	Fair
Acids, Inorganic (HCl, H <sub>2</sub> SO <sub>4</sub> )	Poor

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## Applications Continued....



The magnetizer-inserter equipment shown to the right illustrates the principles of automated production using Plastiform Brand magnets. These principles are easily applied to modern manufacturing processes and are designed to save production time and drastically reduce rejection rates without sacrificing performance. The magnetizer-inserter and other application equipment can be fabricated by a machine builder, or in the manufacturer's own tooling department. 3M Company's Customer Engineering Service is available to provide the technical assistance necessary to get such equipment built and into operation.



A widely recognized advantage of Plastiform material is its adaptability to automated magnetization-in-

**Typical Physical Properties  
@ 23°C (73°F)**

\*All values shown are typical and not for specification purposes.  
\*B-1010 and B-1030 are lubrication type and extra-flexible type respectively.

保溫性質 (保溫)  
吸水性質  
尺寸方向延展性  
連續使用溫度上限

	Value*	Units 1. CGS/U.S. 2. SI(MKSA)
Density <sup>1</sup>	1. 0.134 lbs/in <sup>3</sup> 2. 3.71 gm/cm <sup>3</sup>	
Hardness <sup>2</sup>	55 Shore D	
Tensile Strength <sup>3</sup>	1. 640 PSI 2. 440 N/cm <sup>2</sup>	
Elongation <sup>4</sup> (B-1030 only)	18%	
Flexibility <sup>5</sup> (B-1030 only)	Pass — 180° bending on mandrel equal to 7 x sample-thickness	
Volume Resistivity <sup>6</sup> (50% R.H.)	10 <sup>10</sup> Ohm-cm	
Dielectric Strength <sup>7</sup> (50% R.H.)	1. 250 volts/mil 2. 10 Kv/mm	
Thermal Coefficient of Thickness Expansion (4° to 120°C)	1. 9.8 x 10 <sup>-4</sup> mil/mil per °F 2. 18 x 10 <sup>-4</sup> cm/cm per °C	
Maximum Continuous Operating Temperature	1. 250 °F 2. 120 °C	

**Test Methods**

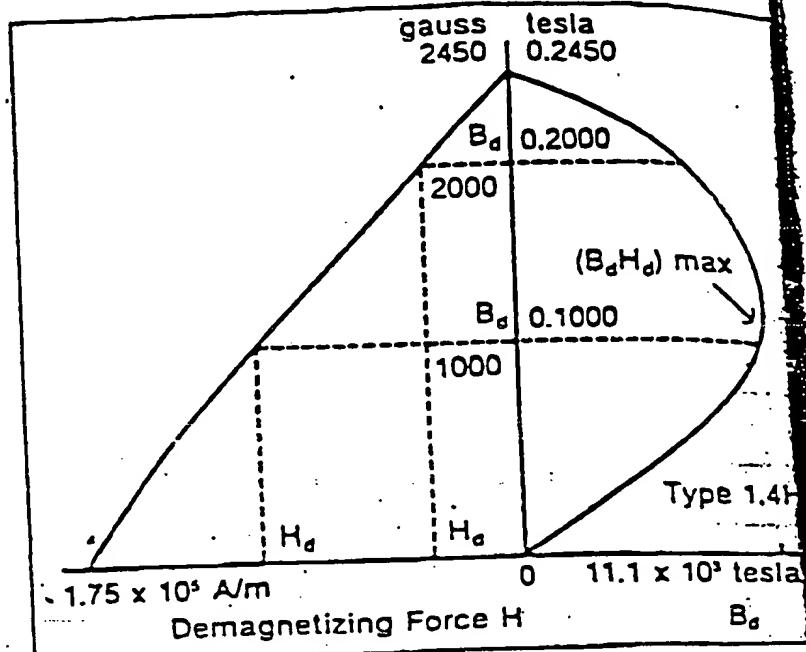
- 1. ASTM D-297
- 2. ASTM D-2240 (10 sec. delay)
- 3. ASTM D-412

- 1. 3M Test Method
- 2. ASTM D-257
- 3. ASTM D-149

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Determination of Typical BH max.

All values shown are averages and not intended for specification purposes. Specification values will be provided upon request.



(迄7.14)

Typical Chemical Resistance (Nitrile Rubber Binder)

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Good — minor or no effect; up to 10% swell in thickness  
Fair — moderate effect; 10-25% swell in thickness  
Poor — severe effect; greater than 25% swell in thickness

Chemical (7 days immersion @ RT)	Performance**
Motor Oil	Good
Transmission Oil	Good
Hydraulic Fluid	Good
Kerosene	Fair
JP-4 Fuel	Fair
Gasoline	Fair
Heptane (PX3)	Good
Antifreeze	Good
Clorox	Good
Turpentine	Good
Water	Good
Detergents	Good
Salt Spray	Good
Aromatic Hydrocarbons (Benzene, Toluene, Xylene)	Poor
Chlorinated Hydrocarbons (Carbon Tetrachloride, Trichloroethylene)	Poor
Ketones	Poor
Alcohols	Fair
Acids, Inorganic (HCl, H <sub>2</sub> SO <sub>4</sub> )	Poor

塗装耐性検査

Acetyl

107036

**Typical Magnetic Properties  
@ 23°C (73°F)**

**\*All values shown are typical and are not intended for specification purposes.**

Property	Value*	Units 1. CGS/U.S. 2. SI(MKS)
Maximum Energy Product ( $B_g H_g$ max)	1. $1.4 \times 10^6$ gauss x oersteds 2. $11.1 \times 10^3$ teslas x amp turns/cm	
Residual Induction' ( $B_r$ )	1. 2450 gauss 2. 245 militeslas	
Coercive Force' ( $H_c$ )	1. 2200 oersteds 2. 1750 ampere turns/cm	
Coercive Force, Intrinsic' ( $H_{ci}$ )	1. 3000 oersteds 2. 2385 ampere turns/cm	
Incremental Permeability	1.04 ratio	
Thermal Coefficient of Magnetization (Reversible)	1. -0.105% per °F 2. -0.19% per °C	
Thermal Coefficient of Intrinsic Coercive Force (Reversible)	1. 0.07% per °F 2. 0.13% per °C	
Peak Magnetizing Force Required	1. 10,000 oerstads 2. 8000 ampere turns/cm	

## Test Methods

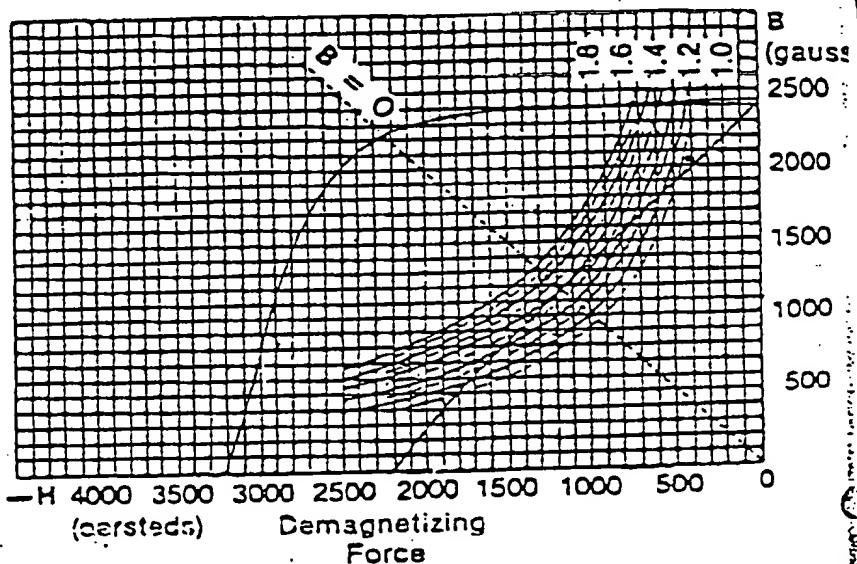
## Pole-coil Hysteresigraph

#### Typical Demagnetization Curve @ 23°C (73°F)

'All values shown are averages and not intended for specification purposes. Specification values will be provided upon request.'

PL-1.4H  
 B<sub>1</sub> 2450 gauss  
 K<sub>c</sub> 2200 oer.  
 H<sub>c</sub> 3250 oer.  
 BH max 1.40 G.O. x 10<sup>6</sup>

### Typical Demagnetization Curve



## 工業材料研究所編譯資料



經濟部資料來源：電波新聞 74.9.12 23.24.25 版

英文字母及四欄四角印  
電話：(02)966100257882

日期：74年11月5日 - (M.R. 74-140)

資料分類：

市場-金屬

題：塑膠磁鐵之技術動向與未來

表 1 塑膠磁鐵之特性

項目	A.G.	Ferrite 系			矽土系				
		FJ-15	FJ-17	FJ-20	LS-40	LJ-60	LJ-80	LJ-100	LJ-120
13.12	磁強度矩 Hc	2.3-2.5	2.5-2.7	2.7-2.9	3.0-4.0	4.3-5.3	5.3-6.1	6.1-6.7	6.7-7.3
	矫頸場力 Hc	1.8-2.2	2.0-2.4	2.0-2.5	2.5-3.5	3.2-3.8	3.8-4.2	4.0-4.4	4.4-5.3
	因數 Kc	2.5-3.5	2.5-3.5	2.6-3.5	>5.0	>5.0	>5.0	>5.0	>5.0
	口大率 Hc/HCo	1.2-1.5	1.5-1.7	1.7-2.0	2.5-3.5	4.0-6.0	6.0-8.0	8.0-10.0	10.0-12.0
	可逆導磁率 μrc	1.0-1.2	1.0-1.2	1.0-1.2	1.0-1.2	1.0-1.2	1.0-1.2	1.0-1.2	1.0-1.2
	溫度係數 ΔHc/°C	-0.18	-0.18	-0.18	-0.05	-0.05	-0.05	-0.05	-0.05
13.12	比 重	3.5-3.7	3.5-3.7	3.5-3.7	3.0-3.5	3.0-3.5	3.0-3.5	3.0-3.5	3.0-3.5
	Hc	100-120	100-120	100-120	30-40	60-70	60-70	60-70	60-70
	拉伸強度 σt	(Kach=11 R) (Kach=11 R)							
	壓縮強度 σc	600-700	600-700	600-700	30-50	200-300	200-300	200-300	150-250
	吸 湿 %	1	1	1	30-50	—	—	—	—
	吸水率 Kc%	1100-1200	1100-1200	1100-1200	—	600-700	600-700	500-700	300-200
K	二正反吸水率	10 <sup>-4</sup> -10 <sup>-3</sup>							
	吸水率 Kc%	10 <sup>-4</sup> -10 <sup>-3</sup>	10 <sup>-4</sup> -10 <sup>-3</sup>	10 <sup>-4</sup> -10 <sup>-3</sup>	—	—	—	—	—
	耐熱性質	150	150	150	100	120	120	120	120
	耐 水	耐水	耐水	耐水	polyamide	polyamide	polyamide	polyamide	polyamide
	不 電	不電	不電	不電	roll	roll	roll	roll	roll

◎FJ-15,17,20

◎LS-40,LJ-60,80,100

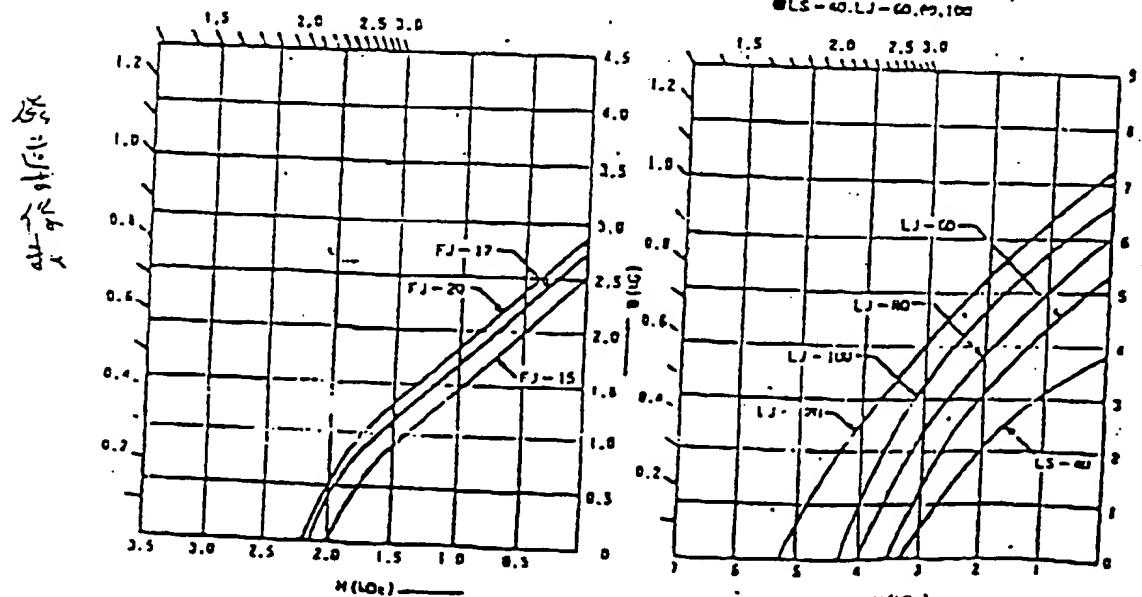


圖 2 ferrite 系塑膠磁鐵退磁曲線(代表)

圖 3 矽土類系塑膠磁鐵退磁曲線(代表)

# 107096 ヘラマ・クス磁石 インジェクショントイプ

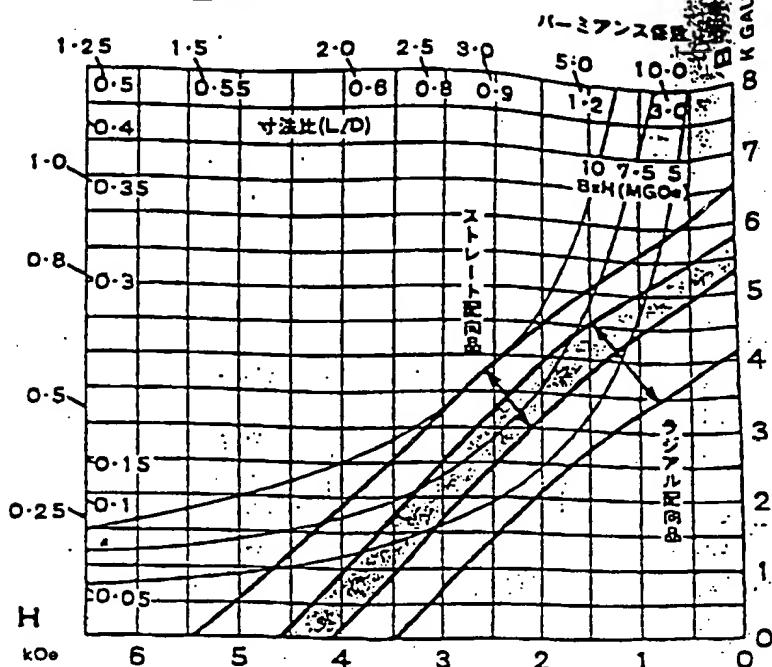
四  
三

## ■特長

- 軽く、われにくく、特殊形状のものも容易に製造できます。
- 精密成形ができます。(寸法精度±0.03%以下)
- インサート・アウトサート成形等、他の部材との一体成形が可能です。
- ラジアル配向・多極電極も可能です。
- 通常の工作機械で容易に加工できます。
- 結合樹脂の選択により、フレキシブルタイプもあります。



## ■減磁特性曲線



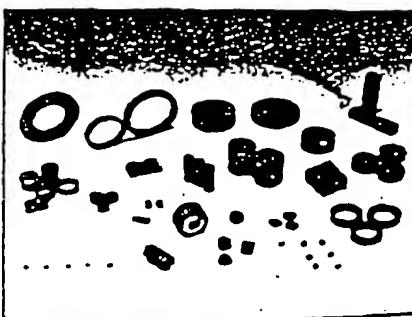
## ■磁気的特性・物理的特性

MAGNETIZING DIRECTION  
radial straight

	記号	単位	ラジアル配向品	ストレート配向品
最大エネルギー積	(B-H)max	MGoe	4~8	6~10
残留磁束密度	Br	G	4,200~5,900	5,300~6,600
保磁力	BHc	Oe	3,500~4,600	4,200~5,400
固有保磁力	zHc	Oe	>8,000	>8,000
Brの温度係数		%°C	-0.035	-0.035
使用温度範囲		°C	-40~150	-40~150
密度	d	g/cm³	5.~5.7	5.~5.8
硬度	HROCK	Rスケール	100~120	100~120

## ■用途

- 小型化、軽量化、高性能化が要求される分野に適してます。
- 回転機器(各種小型モーター、小型発電機等)
  - 計測・通信機器(センサー、リレー、スイッチ、メーター等)
  - 音響機器(スピーカー、マイクロホン、ピックアップ、イヤホン等)
  - 応用機器(マグネットカップリング、磁気録音器、記録品、電子ロック、玩具等)



## ■サンプルをご希望の場合

- 切削加工用材料は直営にとりそろえてあります。即納いたします。
- (詳細はサンプル表をご参照下さい。)

NAKANO PERMALLOY®

7632-1-4  
8570

## **CLASSES AND PROPERTIES**

**NAKANO PERMALLOYS** are nickel iron alloys which meet the requirements of miniaturized, electroinagnetic devices. You can get a strong magnetic flux through week electric current.

**NAKANO PERMALLOYS** are suitable for several shaping. They are well blanked, well drawn, well bent, well welded and well rolled to thin sheets. Whatever shape it may be, you can make it from **NAKANO PERMALLOYS**. Thin sheets make it possible to diminish eddy current and to miniaturize devices.

**NAKANO PERMALLOYS** are available in any shape you want. Send us the drawing of a component and you will get it made of Permalloy already heat treated.

**NAKANO PERMALLOYS** are prepared in accordance with JIS. Our products are based on Japan Industrial Standard c 2531. We can supply uniform alloys in production quantities and at any time you want. Besides the standard products, we produce a number of special grade for unusual applications.

**NAKANO PERMALLOYS** are used for such devices as  
transformers for telecommunication, tape recorder heads and  
shields, light and sensitive relays, solenoid cores, several types  
of magnetic shield and detectors in ground fault circuit  
interrupters.

**Remark.** About shielding, more informations are offered from page 3 to 5.

Table I. Thickness and Tolerances of Sheets and Strips

Thickness	Tolerance on thickness	Thickness	Tolerance on thickness
0.05	±0.005	0.35	±0.02
0.1	±0.01	0.5	±0.03
C2	±0.015	1.0	±0.05

Table 3. Magnetic Characteristics of PB

Magnetic Characteristics		Initial Permeability $\mu_i$	Maximum Permeability $\mu_m$	Coresive force Mc (Oe)	Saturation flux density B <sub>s</sub> (G)	Residual flux density B <sub>r</sub> (G)	Reluctivity $\lambda R \text{ cm}$
P8	NAKANO PERMALLOY	3000-5000	15000-70000	0.15m.m.	14500-15500	8000m.m.	45m.m.
	I I S	3000m.m.	30000m.m.	0.20m.m.	14000m.m.	—	45m.m.

Remarks:  $K_0$  is the initial permeability at the field strength 0.01 Oe.  
 $H_c$  is the coercive force when magnetized at 10 Oe and reversed.  
 $B_r$  is the residual magnetic flux when magnetized at 10 Oe and reversed.  
 $B_r$  is the value for informative reference.

Table 4. Effective Permeabilities of PB

Class	Thickness (mm)	Effective Permeability $M_0$	$\mu_0$ 0.2MHz	$\mu_0$ 10MHz
FB	0.2	NAKANO PERMALLOY	4000-4500	3000-5000
		I I S	3000mils	2400mils.
	0.35	NAKANO PERMALLOY	3500-4000	2300-3000
		I I S	3000mms	2700mms.

"PB" is 45% nickel iron alloy with the biggest saturation induction among the Permalloys.

It costs less than PC and mainly used for transform for telecommunication, choke coil cores, sensitive relay, solenoid cores, D.C. incremented transformers and devices in alternative current equipments.

"PD" is 36% nickel iron alloy with slightly lower magnetic properties, but it offers the highest electric resistivity of 162-cm among the Permalloys. PD is mainly used in transformers for relatively high frequencies.

"PC" is 78% nickel iron molybdenum alloy. It is the most effective material for sensitive and miniaturized electronic devices, because of its highest permeability, the lowest coercive force and the smallest core loss.

PC's thin sheets are profusely used for taperecorder heads, transformers of high grade and several shielding device required extremely weak magnetic field.

"PCS" is called supermalloy which has the permeability about twice as much as normal PC, and its coercive force is under 0.01 Oe. PCS is usually used for the spiral wound tape core in a ground fault circuit interrupter.

Table 2. Classes and Nominal Components

Class	Nominal Component	Remarks
PB	N40-50% Fe remains	45 Permalloy
PC	N70-80% including other special components	78 Permalloy
PD	N10-40% Fe remains	36 Permalloy

Fig. 1. A Hysteresis Curve of PC

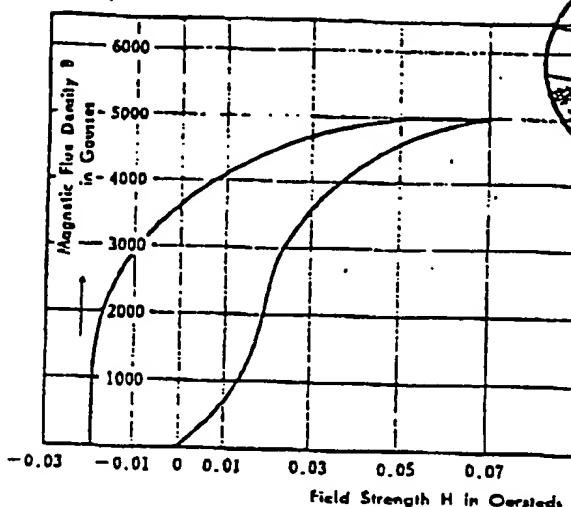


Fig. 2. A Hysteresis Curve of PB

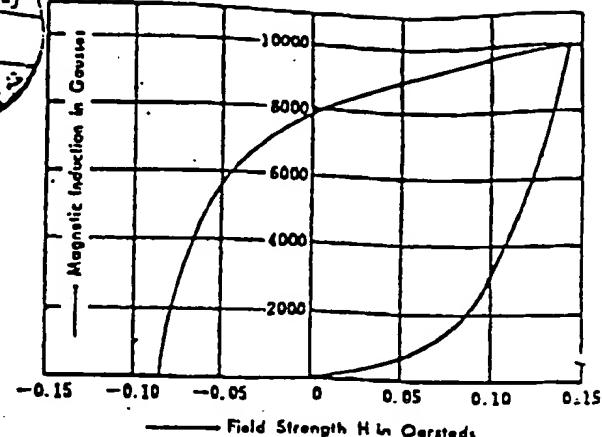


Table 5. Magnetic Characteristics of PC

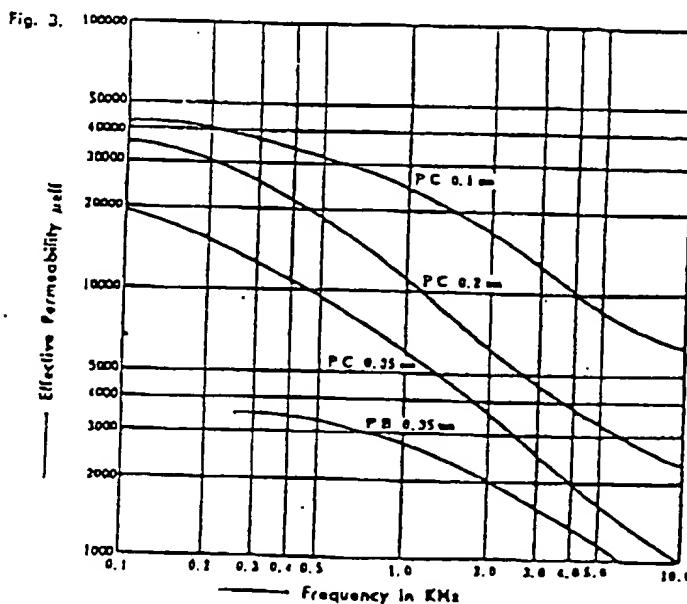
Class	Magnetic Characteristics	Initial Permeability $\mu_i$	Maximum Permeability $\mu_m$	Coercive force $H_c$ (Oe)	Saturation flux density $B_{s0}$ (G)	Residual flux density $B_r$ (G)	Reluctivity $\mu^{-1} \text{cm}$
PC	NAKANO PERMALLOY	40000-150000	120000-300000	0.020-mic.	4500	4000-mic.	55mm.
	J I S	25000-min.	100000-min.	0.025-mic.	6500-min.	—	55mm.

Remarks 1.  $\mu_i$  is the initial permeability at the field strength 0.005 Oe.  
 2.  $H_c$  is the coercive force when magnetised at 10 Oe and reversed.  
 3.  $B_{s0}$  is the saturation flux density when magnetized at 10 Oe and reversed.  
 4.  $B_r$  is the value for informative reference.

Table 6. Effective Permeabilities of PC

Class	Thickness (mm)	Effective Permeability $\mu_e$	$\mu = 0.3 \text{ KHz}$	$\mu = 1 \text{ KHz}$	$\mu = 3 \text{ KHz}$
PC	0.1	NAKANO PERMALLOY J I S	—	25000-35000 20000-min.	10000-16000 9000-min.
	0.2	NAKANO PERMALLOY J I S	25000-35000 20000-min.	10000-12000 8000-min.	—
	0.35	NAKANO PERMALLOY J I S	12000-15000 10000-min.	5500-7500 4000-min.	—

Remark. Measuring current is 0.5 mA



Specimen : Ring core  
outside diameter 45mm  
inside diameter 33mm

Annealing : In hydrogen atmosphere  
1100°C × 2hr.

## FLEXIBLE WIDE SHEET MAGNETS

### THE ULTIMATE IN VERSATILITY!

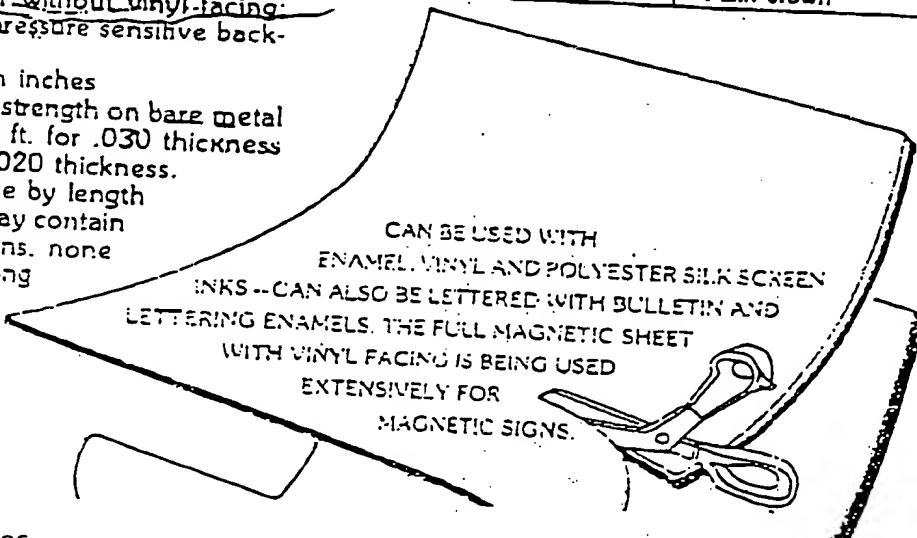
#### PROPERTIES/APPLICATIONS

Flexible Magnetic Sheets are being used for signs, displays, visual aids, toys, games, premiums, magnetic business cards, bulletin boards, indoor and outdoor advertising boards and many other applications. No matter what size or shape you use, the entire surface is magnetic and flexible. It will conform to smooth contours. Since you can cut Flexible Magnetic Sheet with ordinary knives, scissors or dies, you need not worry about expensive cutting equipment.

Consult us concerning any custom requirements you may have. Special thickness, width and colors are available with quantity usage.

- Available with or without vinyl facing, with or without pressure sensitive backing.
- All dimensions in inches
- Typical magnetic strength on bare metal is 55 lbs. per sq. ft. for .030 thickness and 35 lbs. for .020 thickness.
- Shipped 24" wide by length
- Full 100 ft. roll may contain up to three sections, none less than 20 ft. long

Cat. No.	Dimensions	Standard Colors
8221	.020 x 24"	Plain brown/adhesive
8223	.020 x 24"	Semi-gloss white
8320	.030 x 24"	Plain brown
8322	.030 x 24"	Matte white
8324	.030 x 24"	High-gloss white
8620	.060 x 24"	Plain brown



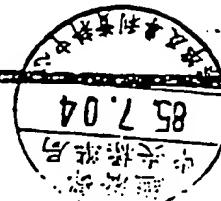
#### Typical Properties

MATERIAL	RESIDUAL FLUX DENSITY BR (GAUSSI)	COERCIVE FORCE HC (OERSTEDS)	MAXIMUM ENERGY PRODUCT BH <sub>max</sub> (MGOe)	MAXIMUM PRACTICAL OPERATING TEMPERATURE (°C)/(°F)	TEMPERATURE COEFFICIENT (± LOSS/°C)	DENSITY (LBS/CUBIC INCH)
FLEXIBLE REGULAR	1600	1370	0.6	120/248	.19	.133
FLEXIBLE HIGH FORCE	2100	1370	1.1	120/248	.19	.140

CUT  
WITH  
SCRS.  
YES  
ES.

- Other thicknesses available
- Higher maximum energy product available

**Magnet**  
SALES & MFG. CO.

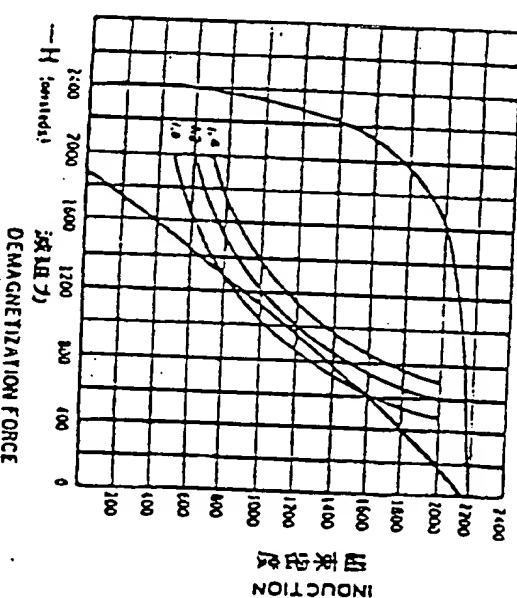


附錄一

● 磁鐵組成 (CONTENTS) :  
 係指永久磁鐵，係以巴尼亞合製鐵化合物  
 (BARIUM FERRITE COMPOSITE) 而  
 成之永久性磁石。

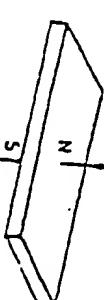
● 減磁特性曲線  
 (DEMAGNETIZATION CURVE)

異方性



磁氣特性和 Characterization	異方性 Anisotropy	等方性 Elongation
最大能級 $\mu$ (BH) max. $\times 10^{-4}$	1.1	0.68
高斯 (Gauss)	2200	16.50
奧斯特力 (Oersted)	1900	1300
瓦斯保力 (Hc)	2400	2400
瓦斯保力 (Hc) (A/P)	-0.1	-0.1
固有保力之溫度係數	0.1	
比 重 (g/cm³)	3.9	3.9

磁化形態 :  
 MAGNETIZATION - 磁化



◎ 吸引力之計算

$$F (\text{dyne}) = a \cdot B^2 / 8\pi$$

- \* a ..... 檢驗表面積
- B ..... 磁通密度
- 1 g ..... 980 (dyne)

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公告



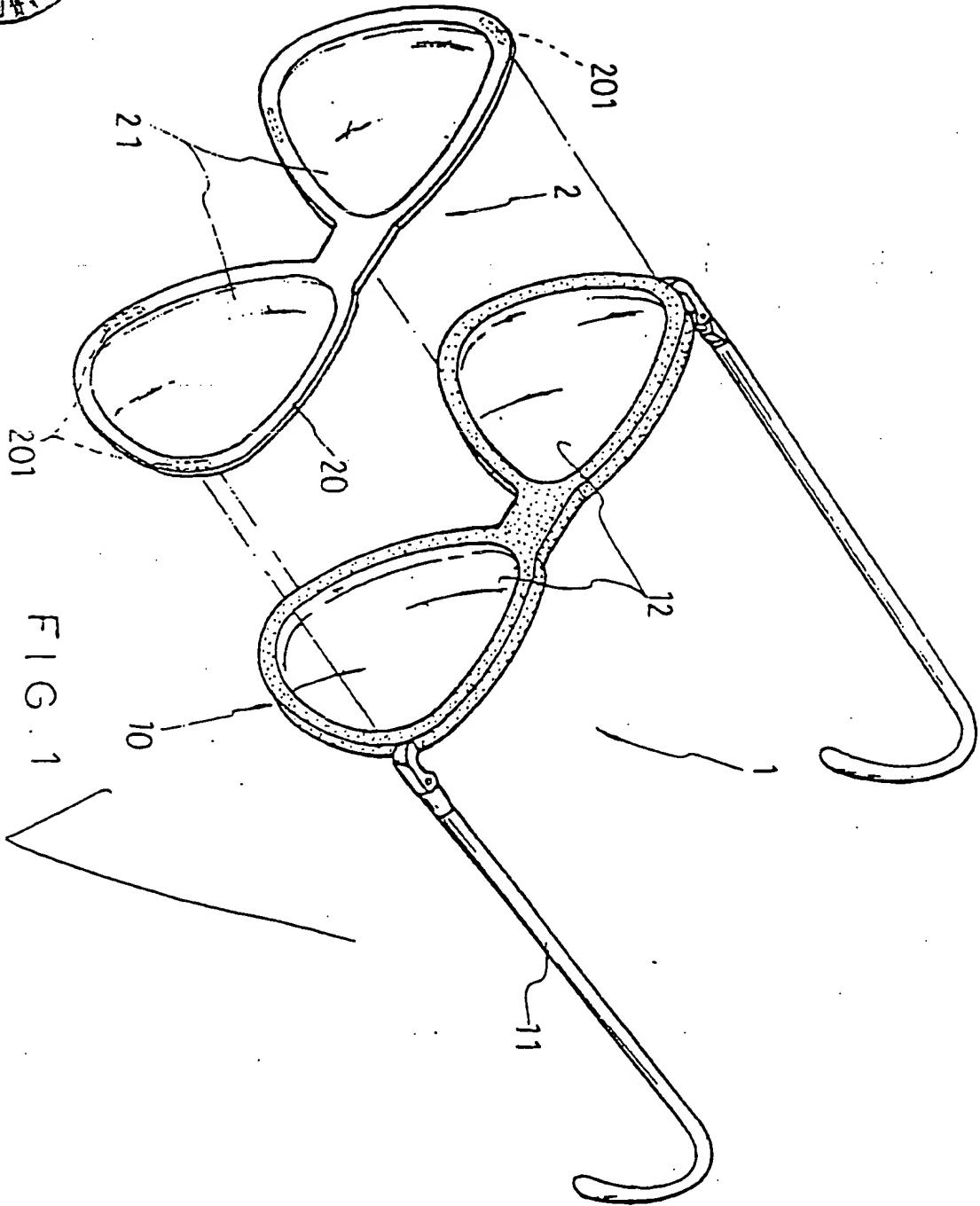
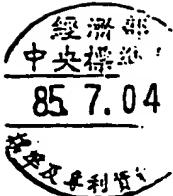
申請日期	76.9.16
考 試	76.20904.5
類 別	(S02C)

(以上各欄由本局填註)

## 發明 新型 專利說明書 (VII)

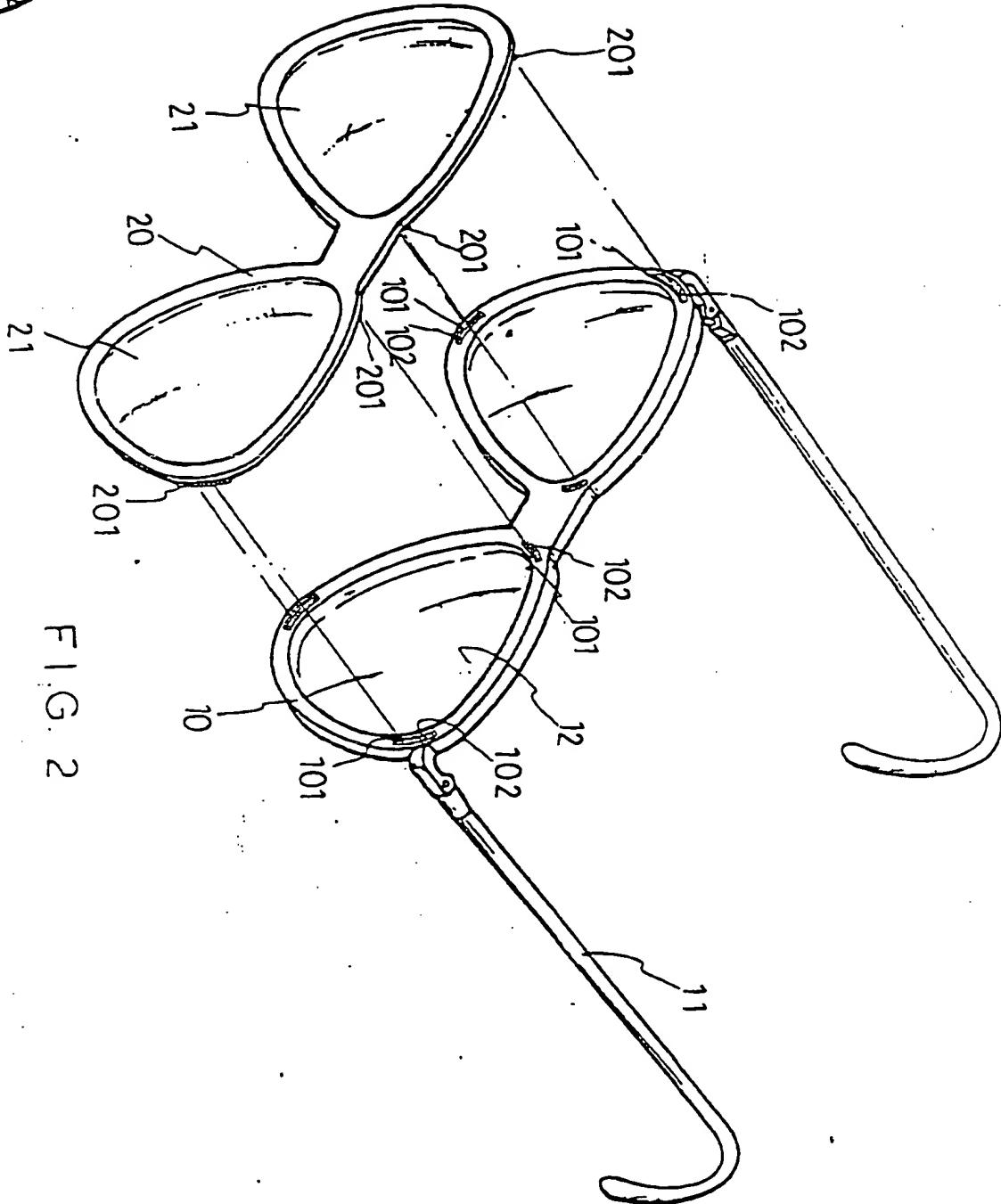
一、發明 創作人 姓名	帶有磁性之眼鏡框及無框眼鏡片	
二、發明 創作人 姓名	姓 名	陳 壘 昌
	國	中華民國
	住居所	中和市景平路六六九號十一樓之九
三、申請人 姓名	姓 名	陳 壘 昌
	國	中華民國
	住居所 (事務所)	中和市景平路六六九號十一樓之九
代表人 姓名	世界專利商標事務所 黃 汝 漢 律師	
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F I G . 2

) 0 9 1 8 2 2 6 2 " 0 2 0 4 0 1

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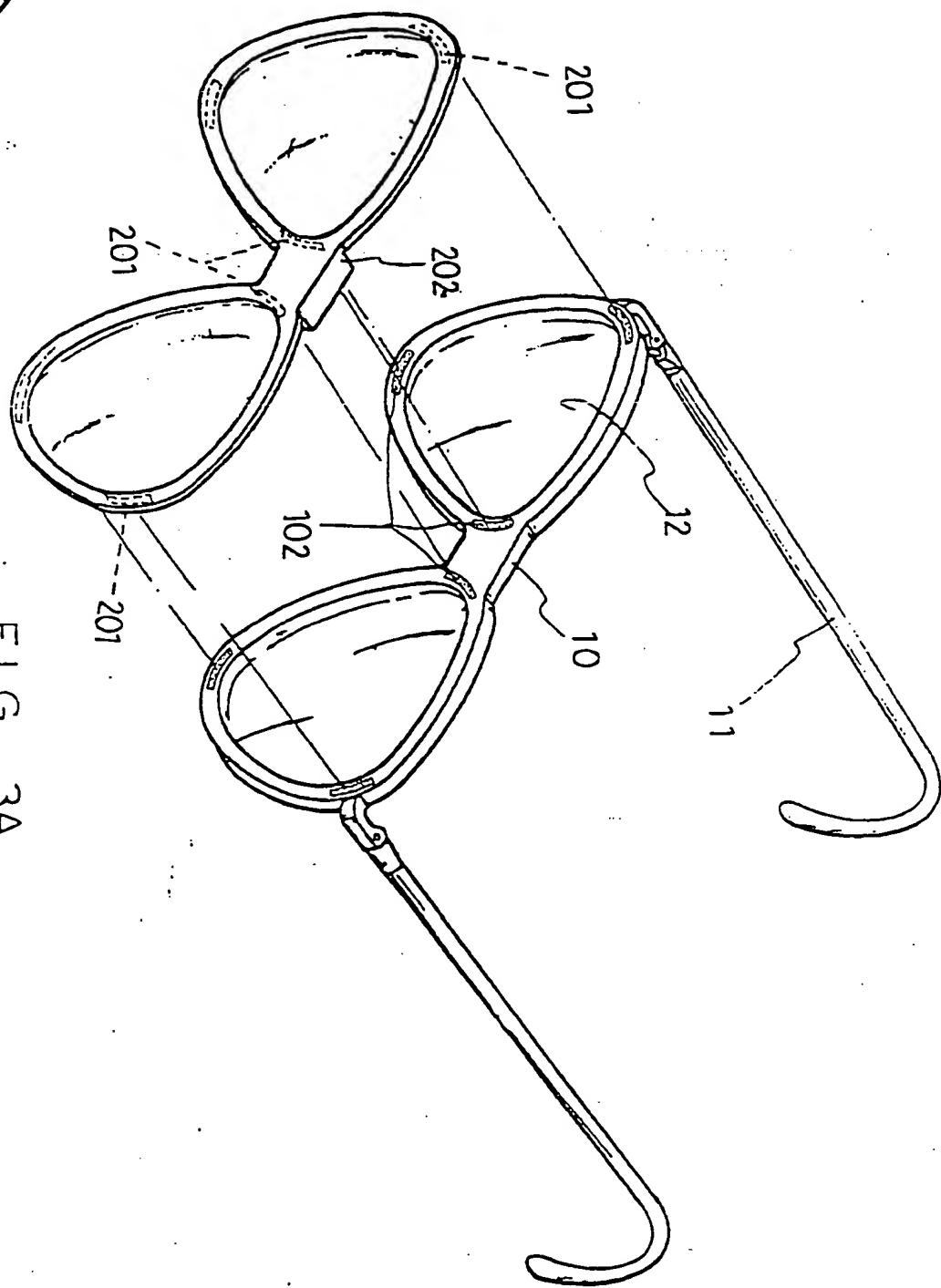


FIG. 3A

圖三甲之二

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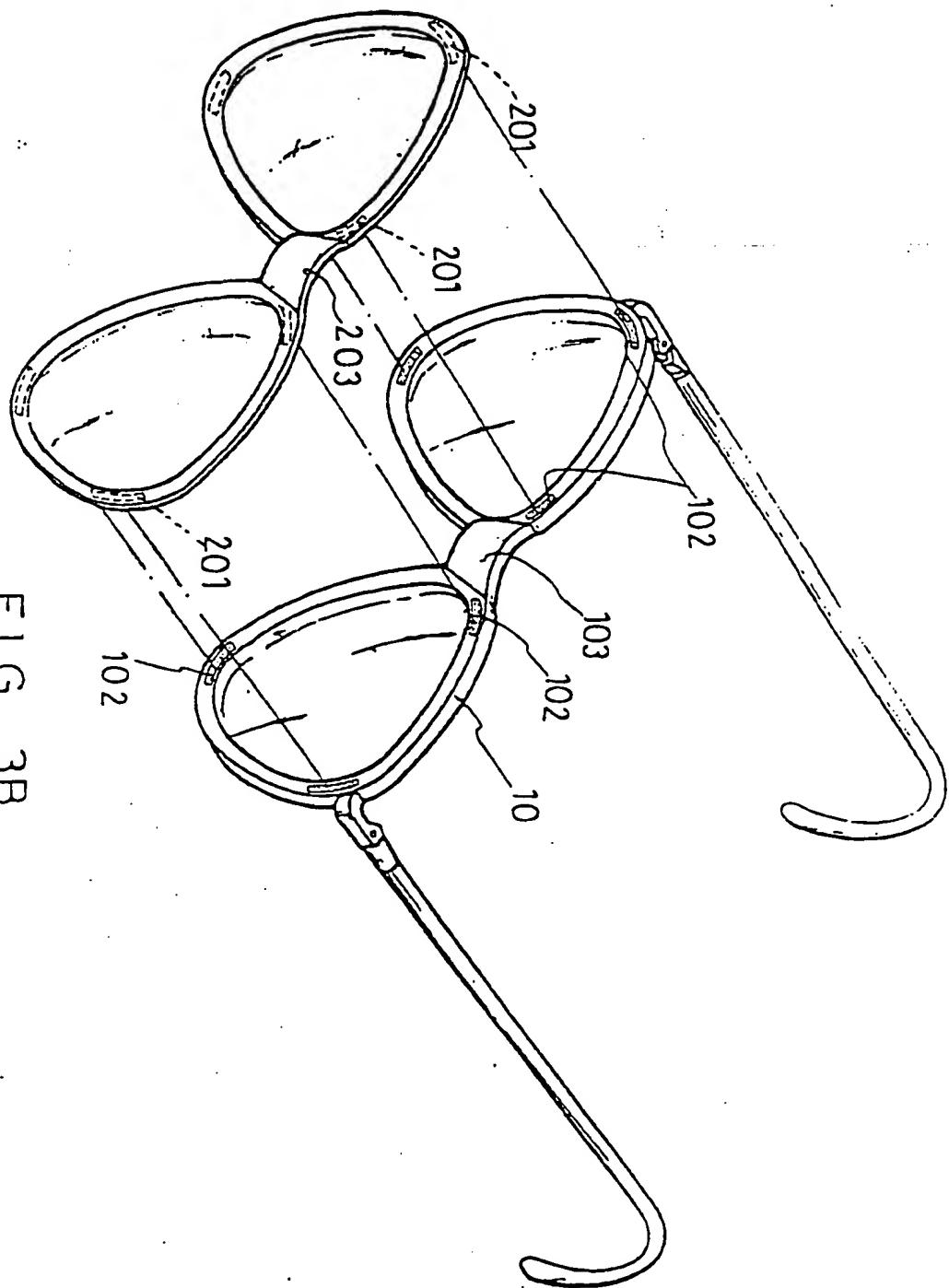


FIG. 3B

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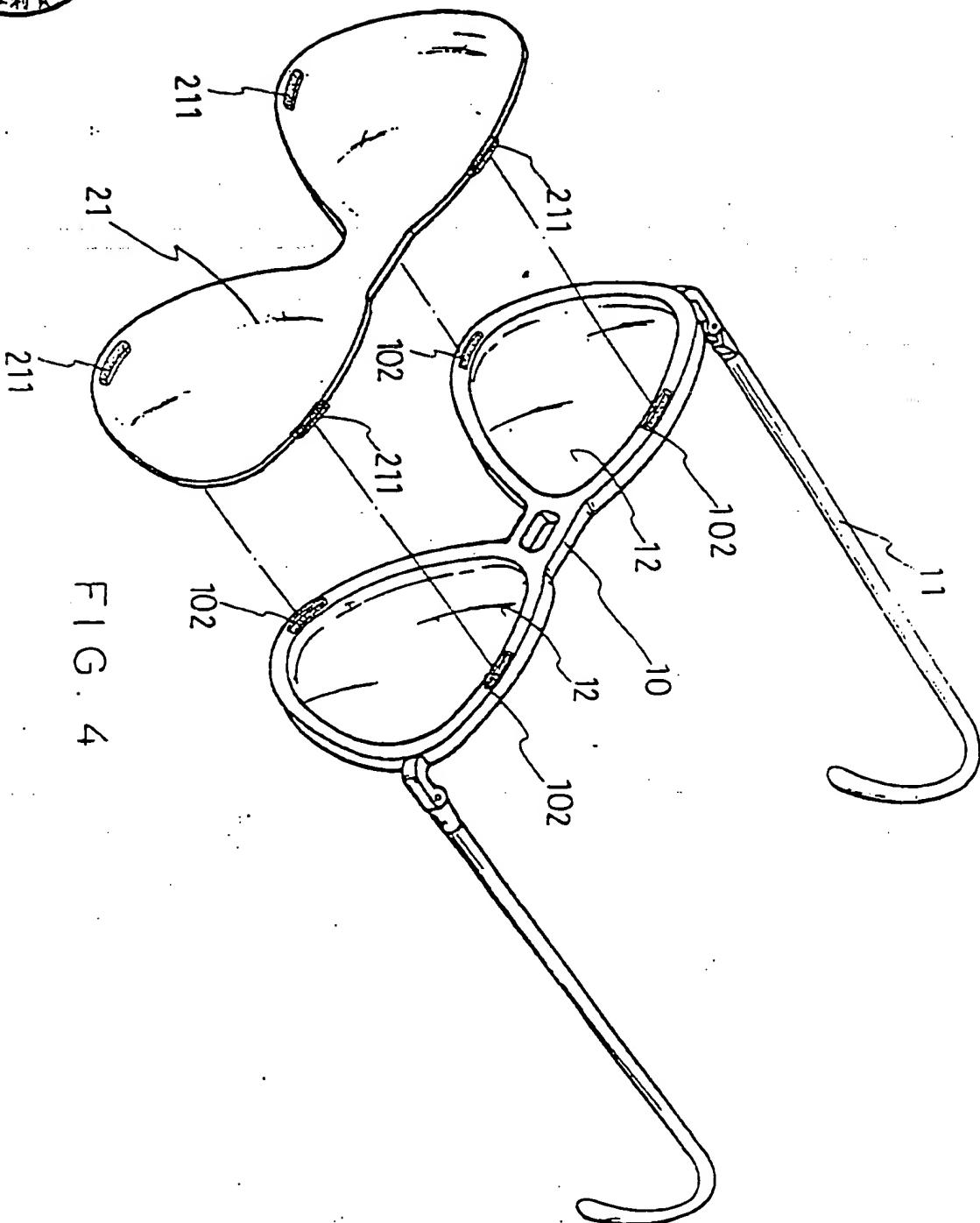


FIG. 4

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